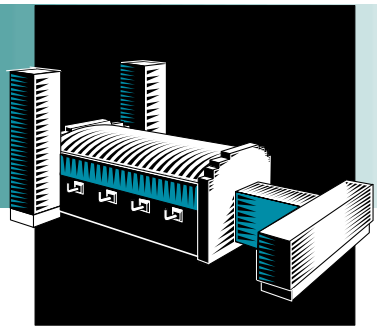
GLASS
Project Fact Sheet



Glass Furnace Combustion and Melting Research Facility

Benefits

- Improved production efficiency through the development of advanced combustion space and glass melt measurement techniques that allow tighter control of the melting process
- Increased energy efficiency and improved product quality resulting from direct measurement of combustion space conditions
- Increased furnace longevity due to measurement and control of sodium volatilization

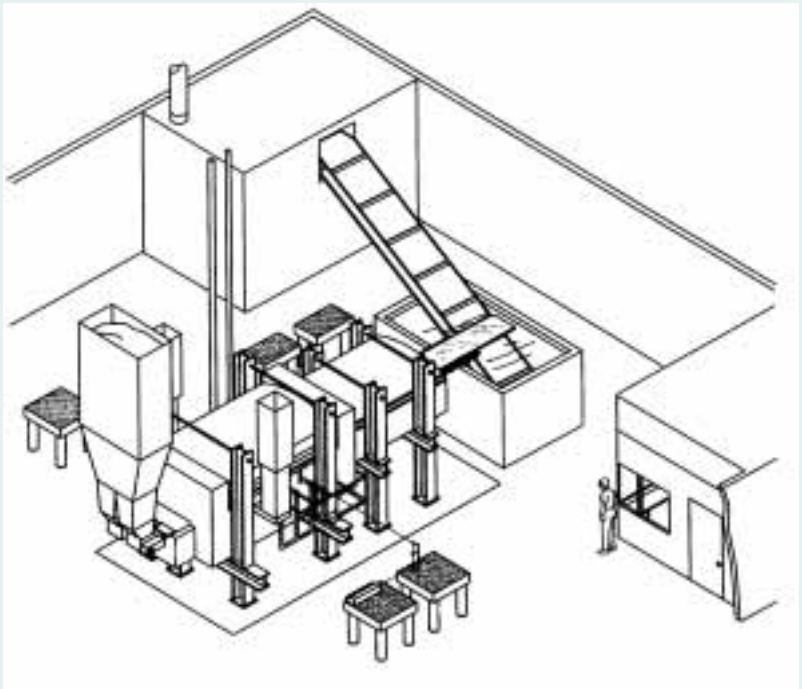
Applications

The pilot-scale melting research facility will be available to industrial and university scientists who wish to pursue combustion and furnace research. Since the facility's research agenda will address specific concerns identified by manufacturers during the project design phase, all industry segments can benefit from the resulting techniques and technologies.

State-of-the-art research facility will be used to develop technology for improved melting process efficiency

All segments of the glass industry—flat, container, specialty, and fiberglass—concur that the industry needs a central research facility to explore technology for improving combustion and furnace efficiency. For example, both air- and oxygen-fired glass melting tanks have severe, high-temperature environments, making it difficult for manufacturers to maintain sensors for monitoring and controlling furnace conditions. This proposed, state-of-the-art facility will afford researchers an opportunity to address these combustion issues and develop techniques for tighter control of the melting process, which in turn will lead to increased production efficiency and product quality for all industry segments.

Example of Optical Furnace Monitoring Techniques



Initial research at the new facility will focus on developing sensors using optical monitoring techniques.

Project Description

Goal: Design and build a state-of-the-art user facility where research and experimentation can be conducted to develop improved monitoring instrumentation for batch reactions, melt properties, and combustion space conditions in glass furnaces in order to improve their production efficiency.

The project approach is three-phased:

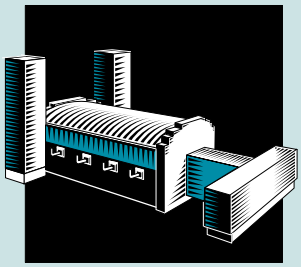
Phase I: Design phase–project partners will perform a study of the melt tank requirements based on visits to existing furnaces and input from manufacturers. The principal goal of Phase I is to achieve an industry consensus on the type of facility needed and the research problems to be addressed.

Phase II: Construction and commission of the facility.

Phase III: First investigations–the overarching objective of Phase III is to provide diagnostic tools, measurements, and analysis of flows and chemical reactions in order to improve combustion control, product uniformity, and refractory life. Project partners anticipate that initial research will be focused on developing nonintrusive sensors using optical monitoring methods.

Progress and Milestones

Input from industry on the configuration and objectives of the facility has been obtained through a survey distributed to industry leaders by GMIC, a workshop conducted following the OIT Glass Industry Project Review at Argonne, IL, in September 1999, discussions with numerous glass production engineers and scientists, and visits to glass manufacturing plants and research centers. The recommendations from industry are that the tank be made large enough and flexible enough to reproduce as many as possible of the configurations and include all of the important features and processes found in industrial melting furnaces: capability for both air and oxygen firing; side and end wall feeders; front, rear, and side wall exhaust ports; electric boost; bubblers; and a throat or waist connecting the melter to a conditioning section. Incorporation of as many as possible of these features, while still providing optical access for measurements in the combustion space and glass, is the principal challenge in the present design and engineering phase. The final tank furnace design is anticipated in early 2001.



Project Partners

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